PCIS-OPC

OPC Server for NuDAQ PCI DAQ Cards

Windows NT/98/2000

User's Guide

Recycled Paper

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Challenge Description	
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How to Use This Guide

This manual is designed to help you use the PCIS-OPC software. It is organized as follows:

- **Chapter 1,** "Introduction to PCIS-OPC" describes the PCIS-OPC software.
- **Chapter 2,** "Installation" describes the system requirements and the step of installing PCIS-OPC software and NuDAQ PCI devices.
- **Chapter 3,** "OPC Interface of PCIS-OPC" lists the interface the NuDAQ PCI card OPC server provides.
- **Chapter 4,** "Configuration and Diagnostic" describes how to configure and diagnose the NuDAQ PCI card OPC server.
- **Chapter 5,** "OPC Client Sample Program" describes the OPC client sample program included in the software.
- **Appendix,** "Notes for Using OPC/DCOM" describes the Windows environment setting for using OPC/DCOM and some notes.

1

Introduction to PCIS-OPC

The PCIS-OPC software is an OPC compliant server that enables data exchange between OPC clients and NuDAQ PCI data acquisition cards.

The OPC server is fully compliant with OPC Data Access Specification 2.0. It follows the requirements of the OPC specification to provide access to data to an OPC client. This server implements version 2.04 of the OPC custom interface that is typically used by C++ and Delphi programs. Also it provides immediate compatibility with a very wide range of application software systems. Any software system with OPC client capability can access the OPC server to monitor and control data to and from the NuDAQ PCI data acquisition cards.

The software includes the NuDAQ PCI card OPC server. A graphical configuration utility is bundled in the OPC server to let you configure and diagnose the operation of the OPC server. You can set the attributes of each data item (I/O point). OPC client software can then access these data items via this name assigned in the server.

2

Installation

2.1 System Requirements

The software requires the following minimum configuration:

- An IBM PC/AT or compatibles
- Windows NT version 4.0 SP4 (or greater), Windows 2000, or Windows 98.

Note: PCIS-OPC can not be used in Windows 95.

- At least 64 MB RAM
- 5 MB free hard drive space
- A CD-ROM drive for installing the software.
- NuDAQ PCI cards the NuDAQ PCI card OPC server supports

2.2 Software Component Installation

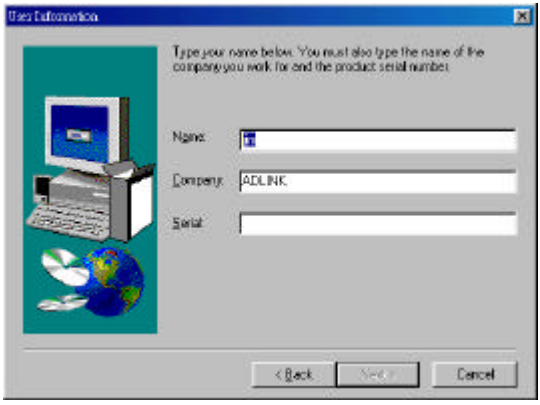
The Setup program provided by PCIS-OPC performs all tasks necessary for installing the software components.

Step 1. Place the "ADLINK All-in-one CD" in your CD-ROM drive.

Step 2. If autorun setup program is not loaded, choose **Run** from the taskbar, then type ***x*:\setup** in the *Run* dialog box. (where ***x*** indicates the CD-ROM drive)

Step 3. Choose **Software Package** item, then you can find PCIS-OPC installation.

Step4. Setup first displays a *Welcome* dialog box. Please click **Next** button to go on the installation. Setup then prompts the following dialog box for you to type your name, the name of the company you work for, and the product serial number. You have to enter the valid serial number to get a valid license. Otherwise you can only run the server in 120 minutes demo mode.


User Information
Type your name below. You must also type the name of the company you work for and the product serial number.
Name:
Company:
ADLINK
Serial:
< Back
Next >
Cancel

Step5. Click **Next** button then follow the guide to setup the software.

[Windows NT only]

Because Windows NT is not a Plug and Play system, you have to register the device driver manually. When the software component installation process is completed, Setup will launch the NuDAQ PCI Configuration Utility, *PciUtil*, for you to register the driver.

For the details of the driver registry in Windows NT, please refer to section 2.4.2.

2.3 Directories and Files

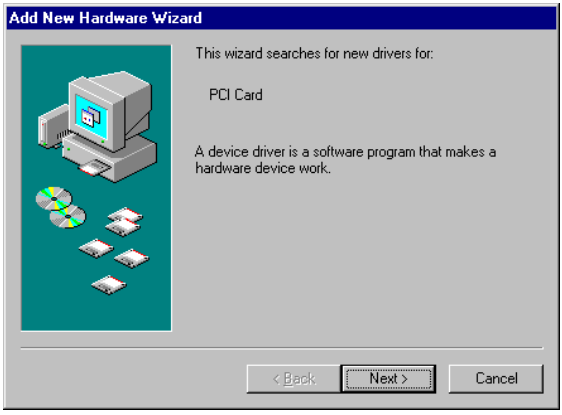
The installation program will copy all necessary files to your computer, register all components with Windows, and create icons in the **Start** menu. When the installation process is completed, the installation directory should contain the following files and sub-directories:

File/Sub-directory	**Description**
NQOPCSvr.exe	NuDAQ PCI card OPC server
Doc <DIR>	Include the PDF documents of NuDAQ PCI card OPC server
Doc\PCISOPC Manual.pdf	NuDAQ PCI card OPC server manual file
Help <DIR>	Online help files
Samples <DIR>	An OPC client sample program

2.4 Device Installation

2.4.1 Windows 98

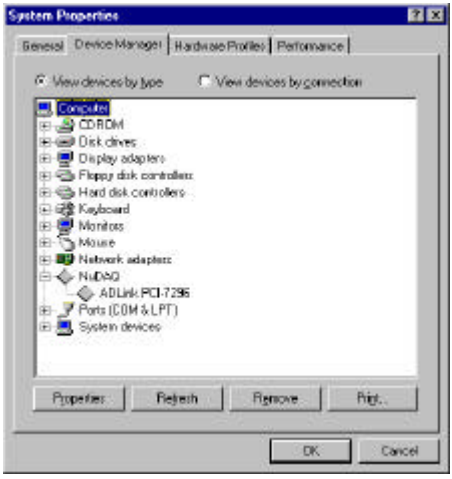
Windows 98 and NuDAQ PCI data acquisition cards work very well together because Windows 98 includes Plug and Play capabilities. Once Windows 98 has started, the Plug and Play function of Windows 98 system will find the new NuDAQ PCI cards. If this is the first time to install NuDAQ PCI cards in your Windows 98 system and you haven't installed any ADLINK NuDAQ PCI card software, you will be informed to install the device driver.


Add New Hardware Wizard
This wizard searches for new drivers for:
PCI Card
A device driver is a software program that makes a hardware device work.
< Back
Next >
Cancel

You can click **Next** button to go on installing device. The device information files are located in "DASK98Inf" directory of ***ADLINK All-in-One CD***. However the device cannot work properly without the software driver files. The installation of any NuDAQ PCI device will get the unsuccessful device installation. Therefore we suggest you just click **Cancel** button to skip it.

After installing PCIS-OPC software component, the INF files and Driver files are copied into appropriate directories. With the well-installed Device Information Files (.INF) and Device Driver Files (.SYS), Windows 98 system will identify and install any plugged NuDAQ PCI data acquisition card automatically at system startup time.

After installing PCIS-OPC software component then re-entering Windows 98, to ensure the success of hardware device installation, you can open the *Device Manager* in **Start>>Settings>>Control Panel>>System**, and then select the **Device Manager** tab.

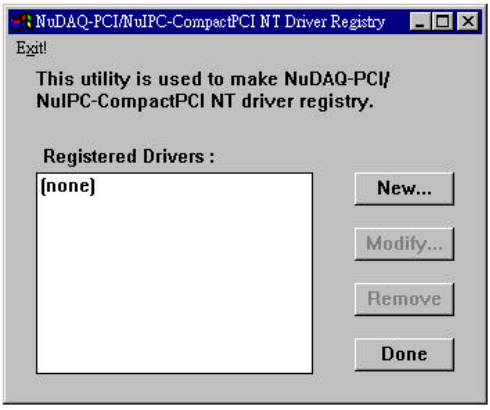


In *Device Manager*, you should find the device in *NuDAQ*. You can double-click the device, select the **Resources** tab to check if I/O port and IRQ resources for the device are allocated successfully.

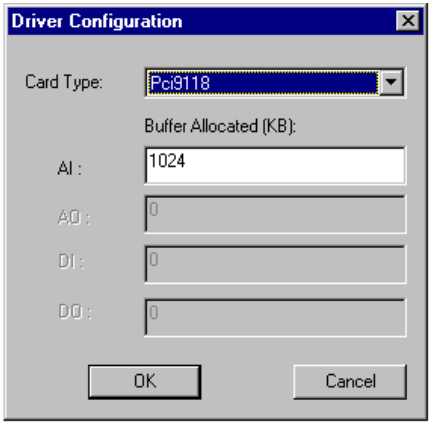
2.4.2 Windows NT

Because Windows NT is not a Plug and Play system, you have to register the device driver manually by NuDAQ PCI Configuration Utility. This utility accompanied with PCIS-OPC is provided for making the driver registries and card configuration. The configuration setting by this utility is the buffer size of the continuous AI/AO/DI/DO operation. The continuous operation means performing data acquisition with pacer trigger and interrupt/DMA transfer. Since NuDAQ PCI card OPC server does not use this functionality, it does not use the buffer. To save the system memory, you can set the buffer size to 0.

The main window of NuDAQ PCI Configuration utility, *PciUtil*, is shown below. In Windows NT system, if any PCI card driver has been registered, it will be shown on the *Registered Driver* list.

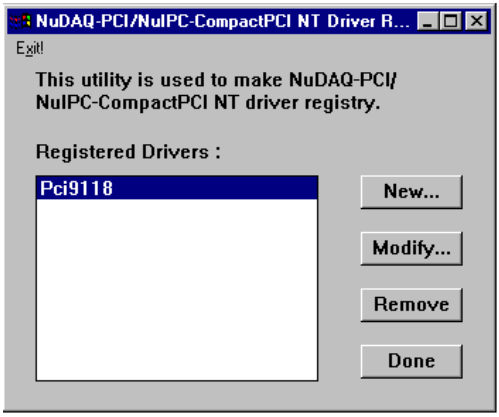


To register one of NuDAQ PCI card drivers, click **New...**button and a *Driver Configuration* window appears.



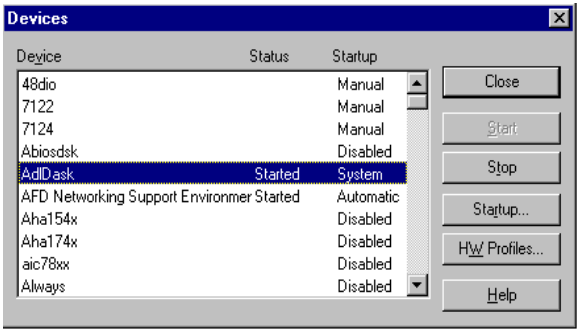
In this window, users can select the driver you want to register and input the parameters in the box corresponding to AI, AO, DI, or DO buffer size for the requirement of your applications. As described above, you can set buffer size to 0.

After the device configurations of the driver you select is finished, click **OK** button to register the driver and return to the *PciUtil* main window. The driver you just registered will be shown on the *Registered Drivers* list as the following figure:



Then you can select **Exit!** command in the menu bar or **Done** button to exit the driver registry utility. To make the registered drivers work, you have to restart Windows NT system.

After re-entering Windows NT and the NuDAQ PCI devices you wish to operate have been plugged in your computer, make sure the device drivers corresponding to those NuDAQ PCI cards are already started. For NuDAQ PCI card OPC server to be able to communicate with NuDAQ PCI card, device driver AdlDask as well as the card' s own device driver (e.g. PCI6208, PCI7200, PCI7230, PCI7234, PCI7248, PCI7250, PCI7252, PCI7296, PCI7432, PCI7433, PCI7434, PCI8554, PCI9111, PCI9112, PCI9113, PCI9114, or PCI9118, etc.) must be started. You can open the *Control Panel*, double-click **Devices**, and a *Devices* window will be shown as below.



If the device status is none, you have to select the AdlDask and the device from the device list and then press the **Start** button.

Note: The AdlDask driver must have been started as you set the card' s own device driver status as started.

2.4.3 Windows 2000

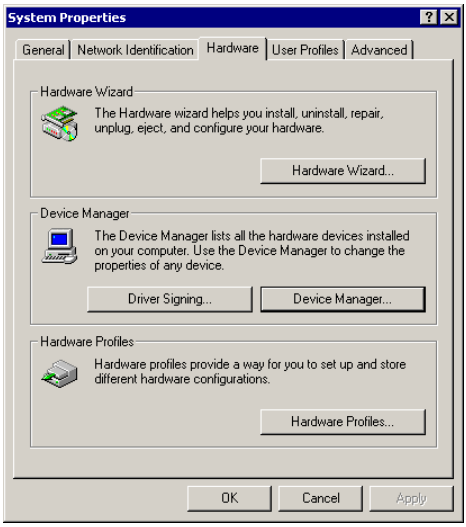
Windows 2000 and NuDAQ PCI data acquisition cards work very well together because Windows 2000 includes Plug and Play capabilities. Once Windows 2000 has started, the Plug and Play function of Windows 2000 system will find the new NuDAQ PCI cards. If this is the first time to install NuDAQ PCI cards in your Windows 2000 system and you haven't installed any ADLINK NuDAQ PCI card software, you will be informed to install the device driver.

Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
This wizard helps you install a device driver for a hardware device.
To continue, click Next.
< Back
Next >
Cancel

You can click **Next** button to go on installing device. The device information files are located in "DASK2000Inf" directory of ***ADLINK All-in-One CD***. However the device cannot work properly without the software driver files. The installation of any NuDAQ PCI device will get the unsuccessful device installation. Therefore we suggest you just click **Cancel** button to skip it.

After installing PCIS-OPC software component, the INF files and Driver files are copied into appropriate directories. With the well-installed Device Information Files (.INF) and Device Driver Files (.SYS), Windows 2000 system will identify and install any plugged NuDAQ PCI data acquisition card automatically at system startup time.

After installing PCIS-OPC software component then re-entering Windows 2000, to ensure the success of hardware device installation, you can open the *Device Manager* in **Start>>Settings>>Control Panel>>System**, and then select the **Hardware** tab.


System Properties
General
Network Identification
Hardware
User Profiles
Advanced
Hardware Wizard
The Hardware wizard helps you install, uninstall, repair, unplug, eject, and configure your hardware.
Hardware Wizard...
Device Manager
The Device Manager lists all the hardware devices installed on your computer. Use the Device Manager to change the properties of any device.
Driver Signing...
Device Manager...
Hardware Profiles
Hardware profiles provide a way for you to set up and store different hardware configurations.
Hardware Profiles...
OK
Cancel
Apply

In *Device Manager*, you should find the device in **NuDAQ Boards**. You can double-click the device, select the **Resources** tab to check if I/O port and IRQ resources for the device are allocated successfully.

3

OPC Interface of NuDAQ PCI card OPC Server

OPC Specification defined the standard OPC interface. Users can use the OPC interface to communicate with OPC server. Following description is the interface of NuDAQ PCI card OPC server.

3.1 OPCServer Object

IOPCCommon

HRESULT SetLocaleID (dwLcid);

HRESULT GetLocaleID (pdwLcid);

HRESULT QueryAvailableLocaleIDs (pdwCount, pdwLcid);

HRESULT GetErrorString (dwError, ppString);

HRESULT SetClientName (szName);

IOPCServer

HRESULT AddGroup (szName, bActive, dwRequestedUpdateRate, hClientGroup, pTimeBias, pPercentDeadband, dwLCID, phServerGroup, pRevisedUpdateRate, riid, ppUnk);

HRESULT GetErrorString (dwError, dwLocale, ppString) ;

HRESULT GetGroupByName (szName, riid, ppUnk);

HRESULT GetStatus (ppServerStatus);

HRESULT RemoveGroup (hServerGroup, bForce);

HRESULT CreateGroupEnumerator (dwScope, riid, ppUnk);

IConnectionPointContainer

HRESULT EnumConnectionPoints (IEnumConnectionPoints ppEnum);

HRESULT FindConnectionPoint (REFIID riid, IConnectionPoint ppCP);

IOPCItemProperties

HRESULT QueryAvailableProperties (szItemID, pdwCount, ppPropertyIDs, ppDescriptions, ppvtDataTypes);

HRESULT GetItemProperties (szItemID, dwCount, pdwPropertyIDs, ppvData, ppErrors);

HRESULT LookupItemIDs (szItemID, dwCount, pdwPropertyIDs, ppszNewItemIDs, ppErrors);

IOPCBrowseServerAddressSpace

HRESULT QueryOrganization (pNameSpaceType);

HRESULT ChangeBrowsePosition (dwBrowseDirection, szString);

HRESULT BrowseOPCItemIDs (dwBrowseFilterType, szFilterCriteria, vtDataTypeFilter, dwAccessRightsFilter, ppIEnumString);

HRESULT GetItemID (szItemDataID, szItemID);

HRESULT BrowseAccessPaths (szItemID, ppIEnumString);

3.2 OPCGroup Object

IOPCGroupStateMgt

HRESULT	GetState (pUpdateRate, pActive, ppName, pTimeBias, pPercentDeadband, pLCID, phClientGroup, phServerGroup);
HRESULT	SetState (pRequestedUpdateRate, pRevisedUpdateRate, pActive, pTimeBias, pPercentDeadband, pLCID, phClientGroup);
HRESULT	SetName (szName);
HRESULT	CloneGroup (szName, riid, ppUnk);

IOPCSyncIO

HRESULT	Read (dwSource, dwCount, phServer, ppItemValues, ppErrors);
HRESULT	Write (dwCount, phServer, pItemValues, ppErrors);

IOPCAsyncIO2

HRESULT	Read (dwCount, phServer, dwTransactionID, pdwCancelID, ppErrors);
HRESULT	Write (dwCount, phServer, pItemValues, dwTransactionID, pdwCancelID, ppErrors);
HRESULT	Cancel2 (dwCancelID);
HRESULT	Refresh2 (dwSource, dwTransactionID, pdwCancelID);
HRESULT	SetEnable (bEnable);
HRESULT	GetEnable (pbEnable);

IOPCItemMgt

HRESULT	AddItems (dwCount, pItemArray, ppAddResults, ppErrors);
HRESULT	ValidateItems(dwCount, pItemArray, bBlobUpdate, ppValidationResults, ppErrors);
HRESULT	RemoveItems (dwCount, phServer, ppErrors);
HRESULT	SetActiveState (dwCount, phServer, bActive, ppErrors);
HRESULT	SetClientHandles (dwCount, phServer, phClient, ppErrors);
HRESULT	SetDatatypes (dwCount, phServer, pRequestedDatatypes, ppErrors);
HRESULT	CreateEnumerator (riid, ppUnk);

IConnectionPointContainer

HRESULT	EnumConnectionPoints (ppEnum);
HRESULT	FindConnectionPoint (riid, ppCP);

3.3 EnumOPCItemAttributes Object

IEnumOPCItemAttributes

HRESULT	Next (celt, ppItemArray, pceltFetched);
HRESULT	Skip (celt);
HRESULT	Reset (void);
HRESULT	Clone (ppEnumItemAttributes);

3.4 Custom Interface/Client Side

IOPCDataCallback

HRESULT	OnReadComplete (dwTransid, hGroup, hrMasterquality, hrMastererror, dwCount, phClientItems, pvValues, pwQualities, pftTimeStamps, pErrors);
HRESULT	OnWriteComplete (dwTransid, hGroup, hrMastererr, dwCount, phClientItems, pErrors);
HRESULT	OnCancelComplete (dwTransid, hGroup);
HRESULT	OnDataChange (dwTransid, hGroup, hrMasterquality, hrMastererror, dwCount, phClientItems, pvValues, pwQualities, pftTimeStamps, pErrors);

IOPCShutdown

void	ShutdownRequest (szReason);

IAdviseSink (old)

void	OnDataChange (pFE, pSTM);

Note: all other functions can be stubs which return E_NOTIMPL.

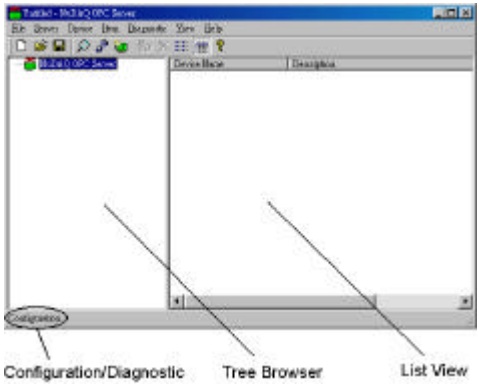
About the detail of each method of interface, please refer to "OPC Data Access Custom Interface Specification" manual on the OPC Foundation website http://www.opcfoundation.org.

4

Configuration and Diagnostic

4.1 Configuration

The graphical configuration and diagnostic functions are bundled in NuDAQ PCI card OPC server (NQOPCSvr.exe). That is, the user interface of the NuDAQ PCI card OPC server is the configuration/ diagnostic window. You can use it to set up and maintain the OPC server. It provides fields for specifying the properties of devices (NuDAQ PCI data acquisition cards), and items (channel or port on the device). You can save the configuration to a file. The NuDAQ PCI card OPC server uses the configuration file you loaded to operate with the devices. The NuDAQ PCI card OPC server automatically loads the default configuration file *NuDAQ.cfg* when starting.



The following sections will guide you through the configuration procedures.

4.1.1 Adding a New Device

From the Tree Browser:

In *Configuration* view, click the right button on the root (NuDAQ OPC Server), then select the **Add Device** command in the popup menu. The *Add Device* dialog box will appear.

From the menu bar:

In *Configuration* view, select **Add Device** from the **Server** menu to bring up the *Add Device* dialog box.

1. In the *Add Device* dialog box, select the NuDAQ PCI card type and the card index you want to add in your configuration. The card index represents the sequence number of the cards belonging to *the same card type series* plugged in the PCI slots. The card index number setting is according to the PCI slot sequence on the computer. The first card (in the most prior slot) is with card index 0. For example, suppose there are one PCI-9111DG card, one PCI-9111HR card, and two PCI-9112 cards plugged on your PC. PCI-9111DG card is plugged in the prior slot than the PCI-9111HG card. The PCI-9111DG card should be set to card index 0. The PCI-9111HR card set to card index 1. The PCI-9112 card in the prior slot set to card index 0. The other PCI-9112 card set to card index 1. The following table categories the NuDAQ PCI devices by card type series.

Card Type Series	Device Types
PCI-6208 Series	PCI-6208V, PCI-6216V, PCI-6208A
PCI-6308 Series	PCI-6308V, PCI-6308A
PCI-7200	PCI-7200
PCI-7230	PCI-7230
PCI-7233	PCI-7233
PCI-7234	PCI-7234
PCI-7248	PCI-7248, PCI-7224
PCI-7249	PCI-7249
PCI-7250	PCI-7250
PCI-7252	PCI-7252
PCI-7296	PCI-7296
PCI-7396	PCI-7396, PCI-7348
PCI-7432	PCI-7432
PCI-7433	PCI-7433
PCI-7434	PCI-7434
PCI-9111 Series	PCI-9111DG, PCI-9111HR
PCI-9112	PCI-9112
PCI-9113	PCI-9113
PCI-9114 Series	PCI-9114DG, PCI-9114HG
PCI-9118 Series	PCI-9118DG, PCI-9118HG, PCI-9118HR

2. After clicking the **OK** button, if the selected NuDAQ PCI data acquisition card needs more properties (e.g.: I/O port setting), another dialog box will be prompted for you to set the properties.
3. The new device appears in the *Tree Browser* and the *List View*. Then you can add items to this device.

4.1.2 Search Devices

In addition to adding the device manually, you can utilize the **Search Devices** command to list all of the NuDAQ PCI cards currently plugged on the computer.

From the menu bar:

Select **Search Devices** from the **Server** menu to bring up the *Search Devices* dialog box.

From the Tree Browser:

Click the right button on the root (NuDAQ OPC Server) then select the **Search Devices** command in the popup menu. The *Search Devices* dialog box will appear.

1. In the *Search Devices* dialog box, the list box lists the NuDAQ PCI cards plugged in the PCI slots. Select the NuDAQ PCI card you want to add into your configuration, then click **Add** button.
2. If the selected NuDAQ PCI data acquisition card needs more properties (e.g.: I/O port selection), another dialog box will be prompted for you to set the properties.
3. The new device appears in the *Tree Browser* and the *List View*. Then you can add items to this device.

4.1.3 Adding a New Item

From the Tree Browser and List View:

In *Configuration* view, click the right button on the device you want to add item to, then select the **Add Item** in the popup menu. The *Add Item* dialog box will appear.

From the menu bar:

In *Configuration* view, select **Add Item** from the **Device** menu to bring up the *Add Item* dialog box.

1. In the *Add Item* dialog box, you need to enter the item name, and select the properties of this item, then click the **OK** button.
2. The new item appears in the *Tree Browser* and the *List View*.

4.1.4 Adding New Items

From the Tree Browser and List View:

In *Configuration* view, click the right button on the device you want to add items to, then select the **Add Items** in the popup menu. The *Add Items* dialog box will appear.

From the menu bar:

In *Configuration* view, select **Add Items** from the **Device** menu to bring up the *Add Items* dialog box.

1. In the *Add Items* dialog box, you will see all the valid items in this device. You can click on the item name column to modify the item name, and right click on the range/port/mode column of the item to change the property(if this property is writeable). You can select the items you want to add, and click the Add button, or click Add All button to add all items.
2. The new item appears in the *Tree Browser* and the *List View*.

4.1.5 Modifying an Existing Item

From the Tree Browser and List View:

In *Configuration* view, click the right button on the item you want to modify then select the **Edit Item** in the popup menu. The *Edit Item* dialog box will appear.

From the menu bar:

In *Configuration* view, select **Edit Item** from the Device menu to bring up the *Edit Item* dialog box.

1. You can modify the properties of this item, then click the **OK** button.
2. The item updates automatically in the *Tree Browser* and the *List View*.

4.1.6 Saving Configuration

You can save the configuration into a file. The default file name extension is *CFG*.

From the menu bar:

Select the **Save** or **Save As…** command from the **File** menu.

4.1.7 Loading Configuration File

You can load the existing configuration file.

From the menu bar:

Select **Open…** from the **File** menu.

Note: The NuDAQ PCI card OPC server automatically loads configuration file *NuDAQ.cfg* (if the file exists) when starting.

4.2 Diagnostic

4.2.1 Start Diagnostic

You can diagnose the NuDAQ PCI card OPC server easily with the *Diagnostic* view.

From the menu bar:

Select **Start Diagnostic** from the **Diagnostic** menu to bring up the *Diagnostic* view.

4.2.2 Reading Item

The values of the readable items are updated periodically.

4.2.3 Writing Item

If you want to output a value to a writable item, please click the right button on the item then select the **Write** command in the popup menu. A dialog box will appear for you to set the output value. You can enter the value and click the **OK** button to write a value to the item.

4.2.4 Stop Diagnostic

From the menu bar:

Select Stop Diagnostic from the Diagnostic menu to stop the diagnostic operation and change to *Configuration* view.

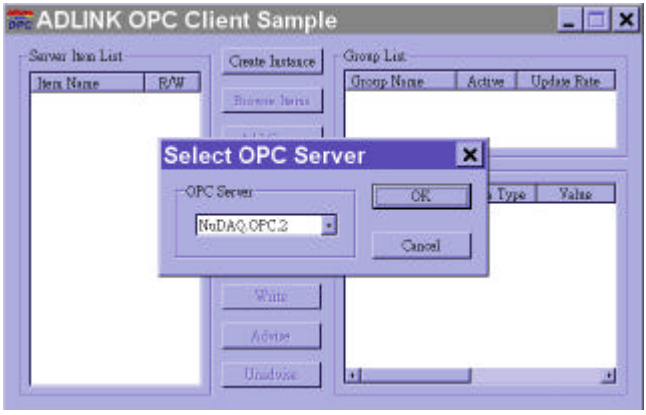
Note: When in Diagnostic status (in *Diagnostic* view), you can not modify the configuration setting, until you execute **Stop Diagnostic.**

5

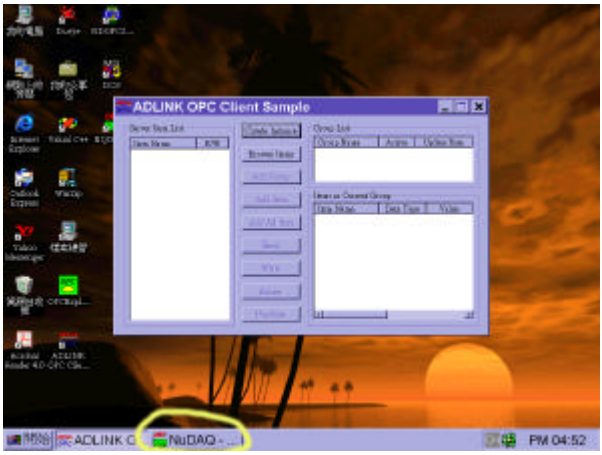
OPC Client Sample Program

This section describes how to run the ALINK OPC Client sample program. Before we continue, please make sure that PCIS-OPC software and the NuDAQ PCI devices are installed correctly. Also, you should have run NuDAQ PCI card OPC server (NQOPCSvr.exe) to configure the devices and items existed on the server, and place the generated file *NuDAQ.cfg* in the directory where NuDAQ PCI card OPC server locates.

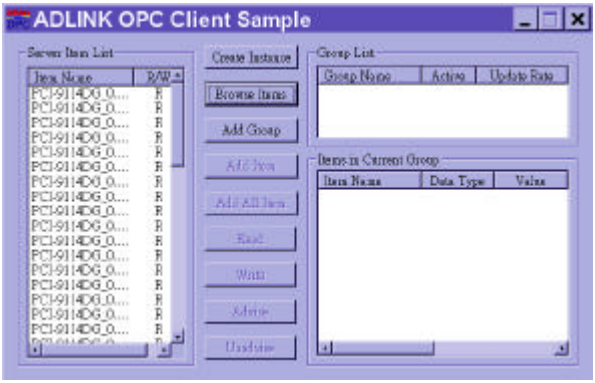
Step 1. Click the **Create Instance** button to launch the NuDAQ PCI card OPC server. A dialog box appears to let you choose which OPC Server (NuDAQ.OPC.2, NuDAM.OPC.2, or HSL.OPC.2) you want to launch.



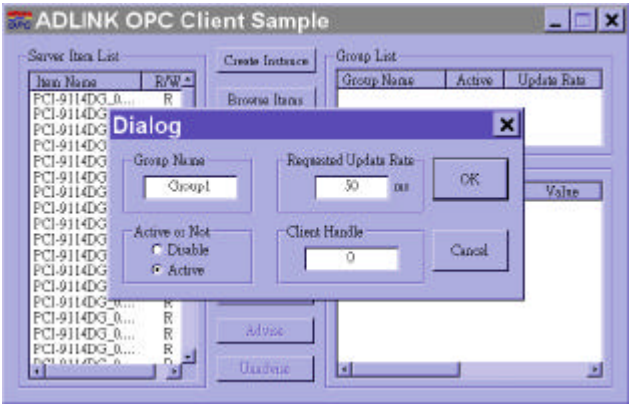
Step 2. The **Browse Items** button is now enabled, and the NuDAQ PCI card OPC server icon appears on the task bar.



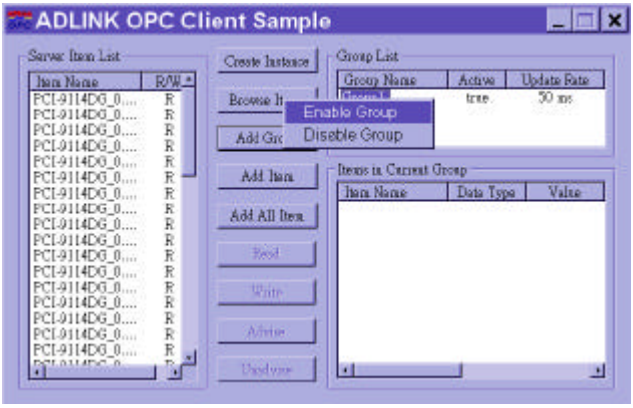
Step 3. Click the **Browse Items** button to query IOPCBrowseServerAddressSpace interface and acquire all items defined in the NuDAQ PCI card OPC server. All items are listed in the *Server Item List*. There are two columns in the list. The first column is the name of each item, which is presented in *device.item* format. The second column is the access right of each item. "R" represents readable. "W" represents writable. "R/W" represents both readable and writable. Now the **Add Group** button should be enabled.



Step 4. Click the **Add Group** button to add a new group to the NuDAQ PCI card OPC server. You should enter *Group Name*, *Requested Update Rate*, *Client Handle*, and select if this group is active. A new group will appear in the *Group List*. There are three columns in the *Group List* list. The first column is the name of a group. The second column indicates the active/inactive status of the group. The third column represents the server-revised update rate (in mini-seconds) for that group.



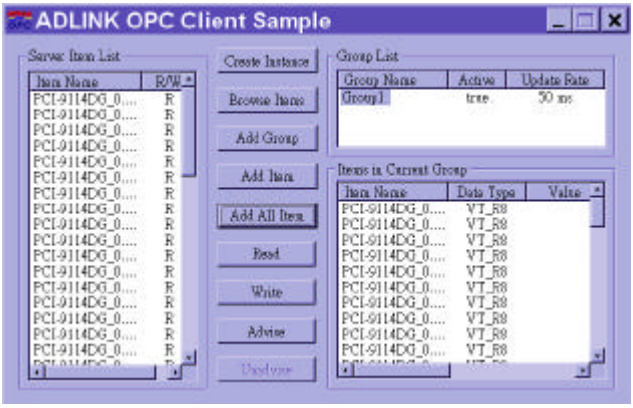
Step 5. In the *Group List* area, you can right-click on a group to set group active/inactive status.



Step 6. After groups have been added, you can select some items and click **Add Item** button to add these items to a selected group. Or you can click **Add All Items** button to add all items on the server to a selected group.

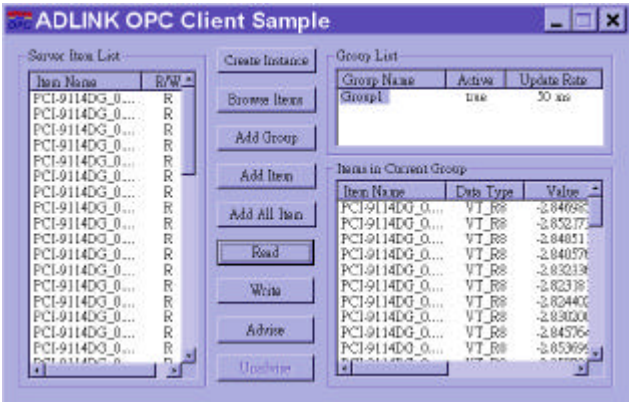
Now we should take a look at the *Items in Current Group* list. There are eight columns in the list, which are described as follows:

- *Item Name*: It is presented in the *device.item* format.
- *Data Type*: canonical data type
- *Vaule*: current data value
- *R/W*: access right
- *Time Stamp*: indicates the time when the item value is acquired.
- *C/H*: client handle. A handle defined in client to identify a specified item.
- *S/H*: server handle. A handle defined in server to identify a specified item.
- *HRESULT*: return error for each item when performing read/write.

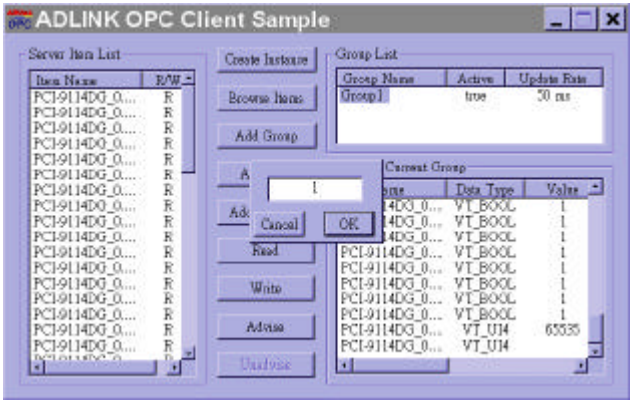


Step 7. After adding items to a selected group, you can perform read/write operation. Or you can build a connection point between server and client. Hence there will be a callback occurred when the item values change.

Step 8. To perform asynchronous read, click **Read** button. The server will read value from corresponding hardware for each item. The value and other parameters returned will be presented in the *Items in Current Group* list.



Step 9. To perform synchronous write, you should first set a value to a writable item. To do this, you can right-click on an item with "W" or "R/W" access right. And a dialog box will appear for you to enter the item value. And then click the **Write** button, the value you specified will write to the hardware.



Step 10. If you want to build a connection between server and client, click the **Advise** button. It advises the NuDAQ PCI card OPC server of client's IOPCDataCallback interface. After that, once item values change, the NuDAQ PCI card OPC server will invoke OnDataChange() to notify the client. The changed values will be presented in the *Items in Current Group* list.

Appendix - Notes of Using OPC/DCOM

1. When the Installation of PCIS-OPC is successful, the NuDAQ PCI OPC server has been registered in system registry. Or you can register it manually by executing the command "NQOPCSvr -RegServer" in DOS Prompt.
2. Because the OPC server is based on the COM/DOCM of Microsoft, your Windows system must support DCOM capability.
3. DCOM is a standard part of the Windows NT 4.0 distribution. You preferably have applied the latest Service Pack for Windows NT 4.0 (above Service Pack 2).
4. DCOM is a standard part of the Windows 98/2000 distribution.
5. You must make sure the setting of the following registry keys.

   \HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\OLE\EnableRemoteConnect = 'Y'

   \HKEY_LOCAL_MACHINE\SOFTWARE\Microdoft\OLE\EnableDCOM = 'Y'
6. The "client" machine would do the same configuration above. You must log on with the same user ID as on the "server" machine.

Product Warranty/Service

ADLINK warrants that equipment furnished will be free from defects in material and workmanship for a period of two years from the date of shipment. During the warranty period, we shall, at our option, either repair or replace any product that proves to be defective under normal operation.

This warranty shall not apply to equipment that has been previously repaired or altered outside our plant in any way as to, in the judgment of the manufacturer, affect its reliability. Nor will it apply if the equipment has been used in a manner exceeding its specifications or if the serial number has been removed.

ADLINK does not assume any liability for consequential damages as a result from our product uses, and in any event our liability shall not exceed the original selling price of the equipment. The remedies provided herein are the customer's sole and exclusive remedies. In no event shall ADLINK be liable for direct, indirect, special or consequential damages whether based on contract of any other legal theory.

The equipment must be returned postage-prepaid. Package it securely and insure it. You will be charged for parts and labor if the warranty period is expired or the product is proves to be misuse, abuse or unauthorized repair or modification.